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A Brief Summary of Economic Conditions



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ANOTHER GOOD HARVEST IS BEING MADE. Silos are being filled, cotton picked, tobacco cut, fruit picked, late potatoes dug, rice harvested. The picking and husking of corn, under way in the Deep South, will expand soon all over the Corn-and-Hog Belt. In the Plains country the seedbed is being prepared for winter grains. Government indication is that about the same acreage of wheat will be seeded for harvest next year as this. * * * Twelve million workers are busy with the Fall harvests and other farm activities—approximately one-fourth of all the people now employed in the United States. Total farm production is a little smaller this year, but with carry-overs the supply of food, feed, and fibers is more than enough for domestic needs. Large quantities of farm products are available for export and domestic reserves. * * * Prices of farm products have been averaging higher this year than last, total cash farm income will be larger. BAE estimate for 1940 is 8.9 billion dollars from marketings and Government payments. This is 360 million more than in 1939; it is the second largest in 10 years.

Commodity Reviews

DEMAND: Pointing Upward

ECONOMIC conditions affecting the domestic demand for farm products continued to improve in August. Industrial production in July and early August was maintained at the higher rate which had been attained between April and June, and there probably was further improvement in industrial employment and pay rolls. Furthermore, weekly indexes by mid-August were indicating renewed gains in industrial production. Some additional improvement in the domestic demand for farm products is expected during the remainder of this year.

There is growing evidence of the stimulating effects on industry of the defense program. Construction contracts awarded in July were the highest for any corresponding month since 1929, and output in the steel, machinery, airplane, and chemical industries continued to expand. In addition, automobile output passed the low point incident to introduction of 1941 models in the week of August 10, and probably will increase rapidly for 2 or 3 months.

The United Kingdom is taking an increasing share of our industrial exports, now that continental European import markets are closed, but the probable adverse effects on domestic industrial activity and domestic demand for farm products of any loss of industrial exports which might follow an end to the European conflict will become less as industrial operations in connection with our domestic defense program expand.

The adverse influence of the loss of a considerable portion of our export market for farm products on the one hand and the stimulating effects of improving domestic consumer demand on the other have resulted in little change since June in the average level

of prices received by farmers. Improving consumer demand, however, has been reflected in higher farm prices for some of the important farm products which are largely consumed domestically, particularly dairy products and hogs.—P. H. BOLLINGER.

PRODUCTION: Average

Plus signs appeared in the August estimates of production of many of the principal crops this year compared with last. These include wheat, oats, flaxseed, rice, grain sorghums, hay, peanuts, and vegetables. Minus signs appeared against corn, cotton, tobacco, sweetpotatoes, sugarcane, sugar beets, apples, peaches, and grapes. The Crop Reporting Board said that "aggregate crop production is expected to be about average, and considering stocks on hand, supplies of most crops will be ample."

The Board added: "One of the outstanding features of the crop situation this season is the prospect that the general level of crop yields again will be much above average, even though not quite equal to the exceptionally high yields of the last three seasons. Most of the increase appears to be the result of an upward trend in the yields (per acre) of a number of leading crops, particularly cotton, corn, tobacco, beans, and potatoes, due to technological improvements, new varieties, changes in cultural and fertilization practices, and shifts of acreage to higher yielding areas."

PRICES: Higher

The Government index of prices of farm products was 96 for August, compared with 95 in July, and with 88 in August last year. Prices of dairy products, eggs, and citrus fruits advanced during the past month,

but there were substantial declines in prices of potatoes and apples, and smaller decreases in grain and cotton.

Prices of most farm products were higher in the first 8 months of this

Index Numbers of Prices Received and Paid by Farmers

[1910-14=100]

Year and month	Prices received	Prices paid	Buying power of farm products ¹
1939			
June.....	89	120	74
July.....	89	120	74
August.....	88	119	74
September.....	98	122	80
October.....	97	122	80
November.....	97	122	80
December.....	96	122	79
1940			
January.....	99	122	81
February.....	101	122	83
March.....	97	123	79
April.....	98	123	80
May.....	98	123	80
June.....	95	123	77
July.....	95	122	78
August.....	96	122	79

¹ Ratio of prices received to prices paid.

year compared with last. Hogs were the principal exception. Hogs may do better after the turn of the year when marketings decrease. It is expected that during the remainder of this year, the average of prices of all the principal farm products will be maintained around current levels.

INCOME: Increase

Farm income usually rises sharply this month as the new cotton crop goes to market and the totals for meat animals are increased. Peak of income from all commodities is usually in October. The October average in the last 4 years was approximately 1 billion dollars. Income was probably higher this August than last, but total for the last 4 months of the year—September through December—may be about the same as in 1939. Total consists of cash from marketings, commodity loans, and Government payments.

A preliminary estimate by BAE is that cash farm income will total about

Prices of Farm Products

Estimates of average prices received by farmers at local farm markets based on reports to the Agricultural Marketing Service. Average of reports covering the United States weighted according to relative importance of district and States.

Product	5 year average, August 1909 July 1914	August average, 1909-13	August 1939	July 1940	August 1940	Parity price August 1940
Cotton, lb.....cents	12.4	12.3	8.70	9.54	9.23	15.75
Corn, bu.....do	64.2	70.9	45.7	63.1	63.1	81.5
Wheat, bu.....do	88.4	89.5	54.5	61.4	60.1	112.3
Hay, ton.....dollars	11.87	11.35	6.77	7.10	7.10	15.07
Potatoes, bu.....cents	69.7	84.0	69.3	82.1	68.0	81.5
Oats, bu.....do	39.9	40.9	25.4	28.3	26.7	50.7
Soybeans, bu.....dollars	(1)	(1)	.64	.73	.67	1.73
Peanuts, lb.....cents	4.8	4.8	3.39	3.42	3.44	6.10
Apples, bu.....dollars	.96	.72	.66	1.08	.79	1.22
Oranges, box.....dollars	(1)	(1)	1.53	1.50	1.75	2.46
Grapefruit, box.....dollars	(1)	(1)	.89	.94	1.35	1.54
Lemons, Calif. box.....dollars	(1)	(1)	2.20	1.95	2.90	2.49
Beef cattle, cwt.....do	5.21	5.08	6.50	7.26	7.21	6.62
Hogs, cwt.....do	7.22	7.30	5.47	5.78	5.83	9.17
Chickens, lb.....cents	11.4	11.7	13.0	13.6	13.4	14.5
Eggs, doz.....do	21.5	18.1	17.5	16.4	17.2	25.5
Butterfat, lb.....do	26.3	24.1	22.4	25.9	26.7	31.1
Wool, lb.....do	18.3	18.8	22.0	27.9	27.3	23.2
Veal calves, cwt.....dollars	6.75	6.59	8.13	8.56	8.59	8.57
Lambs, cwt.....do	5.87	5.51	6.94	7.85	7.52	7.45
Horses, each.....do	136.60	137.30	78.00	74.50	72.50	173.50

¹ Prices not available.

² Adjusted for seasonality.

³ Revised.

⁴ Post-war base.

8.9 billion dollars in 1940. This figure is about 360 million dollars—5 percent—higher than in 1939. It would be the second largest for any year since 1930. Highest was 9.1 billion dollars in 1937. Livestock and live-stock products will yield a larger part of the gain than crops in 1940 compared with 1939.

The following table gives totals for July (last month of record), and cumulative figures January-July, with comparisons:

Month and year	Income from market- ings	Income from Government pay- ments	Total
July:			
1940-----	668	35	703
1939-----	605	36	641
1938-----	647	34	681
1937-----	811	11	822
January-July:			
1940-----	4,082	445	4,527
1939-----	3,723	450	4,173
1938-----	3,837	291	4,128
1937-----	4,328	341	4,669

COTTON: Outlook

BAE says that the outlook for domestic consumption of cotton continues unusually favorable, with the 1940-41 season expected to exceed the near-record high of 7½ million bales consumed in 1939-40. But export prospects continue exceptionally unfavorable—in Great Britain, Japan, and China, three of the most important markets now open to American cotton, mill activity has recently declined considerably. Exports totaled only 51,000 bales last month, as contrasted with approximately 5 times this quantity in August 1939.

United States supply of cotton—new crop (as estimated in September) plus carry-over—is approximately 1½ million bales smaller this year than last. Total is about 23 million bales.

Principal supports to prices are the continuing high rate of domestic consumption and the Government loan program. Government loan rates

on the 1940 crop range (for Middling 1½" on a net weight basis) from a high of 9.90 cents in the Carolina mill areas to 9.16 cents in west Texas and New Mexico. Rates on a gross weight basis are 0.40 cents less. Compared with last year's minimum loan of 8.30 for Middling ½" on a gross weight basis, the minimum this year will be 8.51 cents.

WHEAT: Supply Up

United States wheat supply estimate has been raised to 1,045 million bushels for 1940-41. This includes the 1940 crop plus carry-over. The supply for 1939-41 was 1,007 million bushels. A break-down of the 1940-41 supply shows 421 million bushels of Hard Red Winter, 241 million of Soft Red Winter, 225 million Hard Red Spring, 53 million Durum, and 105 million bushels of White wheat.

Domestic disappearance of wheat is expected to be about 700 million bushels in 1940-41. This would make about 345 million bushels available for export, or for carry-over on July 1 next. Export prospects for 1940-41 are not good. Exports in 1939-40 totaled about 45 million bushels. Prices of wheat in late August were about the same as at that time in 1939, supported principally by the Government loan program.

Acreage allotted for seeding the 1941 crop under the Agricultural Adjustment Act was announced at 62 million acres, the same as the 1940 allotment. Actual seedings totaled 64.4 million acres in 1940. Average yields on a similar area in 1941 would total about 750 million bushels of wheat. This would be about 50 million bushels in excess of probable domestic disappearance.

FEED: Ample Supply

BAE estimates total supplies of feed grains for the 1940-41 feeding season based on August 1 conditions at 113 million tons, compared with 118 mil-

lion tons in 1939-40. But the number of feed-grain-consuming livestock will be about 4 percent less than the number last year. This means that total supplies of feed grains per unit of livestock will be about the same as in 1939-40.

The quantity of corn held under seal will be considerably larger on October 1 this year than last. Deducting from the prospective supply of feed grains the probable volume of corn under loan and held by the Government on October 1, the total supply of feed grains will be about 100 million tons, as compared with 111 million last year. Excluding corn under loan, the supply of feed grains per livestock unit will be about 6 percent smaller in 1940-41 than in 1939-40.

CATTLE: On Feed

Considerably fewer cattle will be fed this fall and winter than last, on the prospect that supplies of feed grains will be smaller and corn prices higher. This will mean smaller marketings of grain-fed cattle in the first half of 1941 than in the like period of 1940, and a higher level of prices provided consumer demand for meats is well maintained. The number of cattle on feed in the Corn Belt on August 1 was 3 percent smaller than on that date last year.

The decrease in feeding reflects the unfavorable returns from cattle feeding in the past season, when prices of both corn and feeder cattle were high in relation to prices of slaughter cattle. Prices of corn and other feeds are generally higher than a year earlier, but with prospects for a weaker feeder demand it is expected that prices of stocker and feeder cattle will average not much higher this fall than last.

BAE says it is probable that the spread between prices of feeder steers and slaughter steers will be wider than it was last fall. Marketings of grain-fed cattle are expected to continue large during the remainder of 1940, but no larger than a year earlier in

view of the reported decrease in cattle on feed August 1. Prices of these cattle probably will continue near the levels of recent months, with an advance more likely than a decline.

An increase in numbers of cattle on farms and ranches is expected in the next few years, continuing the up-swing which began in early 1938. January 1 figures are likely to show an increase of about 2 million head over January 1 last, and 5 million more than on January 1, 1938. Cattle prices probably will trend downward after 1941, unless there should be a substantial improvement in consumer demand for meats.

HOGS: Reduction

Evidence accumulates that the number of sows farrowing this fall will be at least 12 percent smaller than in 1939. The decrease may be even more, depending on the outturn of the corn crop. In any case, the total production of pigs in 1940—spring crop and fall crop—will be sharply reduced from the 1939 production which was the largest in the 17 years of Government record.

The smaller production this year means a marked reduction in marketings of hogs in 1940-41. A large part of this decrease is expected to occur after November or December 1940. The seasonal increase in marketings from September through December this year may be about as large as the increase in the like period of 1939, followed by a large seasonal reduction in late winter and early spring.

The unfavorable relationship between hog prices and corn prices this summer was reflected in the marketing of lighter weight hogs in August. For the first time in months, prices were higher than at the same time a year earlier. But prices of lard and other fats and oils were weak, reflecting large storage supplies and the loss of European markets. Storage stocks of both pork and lard are considerably larger than at this time last year.

The best elements in the hog situation are the smaller 1940 production of pigs and the prospect for improved domestic consumer demand for meats. A further moderate decrease in pig production in 1941 seems likely.

LAMBS: Record Crop

This year's crop of lambs—32.7 million head—was the largest on record. The increase this year over last—about 3 percent—was principally in Texas, the leading western sheep-producing State. The total crop in the other western sheep States was a little smaller this year than last, whereas in the native sheep States the crop was a little larger.

The increase in total production this year indicates larger marketings in the last half of 1940 compared with the like period in 1939, but prices will be supported by improved consumer demand. * * * Meanwhile, it is indicated that fewer lambs will be fed this fall and winter than last. Supplies of feed grains in the Corn Belt will be smaller, and feed crop production in the lamb feeding areas of western Nebraska and Colorado will be materially less than in 1939.

A factor tending to hold down the number of lambs fed this fall and winter is that for the most part the returns from feeding operations last season were unfavorable for lamb feeders. Up to early August only small numbers of lambs in the western States had been purchased on contract for fall delivery, with very few purchased by western feeders.

RICE: Supply Down

The rice situation was changed in August when southern crops were damaged by Gulf storms. Crop prospects were reduced from August 1 indications that the total supply this year—new crop plus carry-over—would be the largest on record. Prices have been averaging higher than at the same time last year. The higher prices of

rice during the summer—notwithstanding the prospects for large supplies—apparently reflected an improved consumer demand. Total exports and shipments of rice from continental United States were a little larger in 1939-40 than in the preceding year.

FATS, OILS: Output

Factory production of fats and oils was 11 percent larger in the first 6 months of 1940 than in the first half of 1939, and apparently was the largest on record for this period. Increased output of lard, tallow, greases, and soybean oil accounted for most of the gain. Imports of fats and oils were smaller, and exports larger, in the first half of 1940 than a year earlier. Stocks of fats and oils on June 30 were unusually large.

BAE says that improvement in industrial activity resulting in part from increased defense expenditures will be a factor tending to strengthen the demand and prices for domestic fats and oils. It is emphasized, however, that large supplies of most fats are available in the United States and other primary producing countries, and that prices are not likely to show any major gain unless continental European markets are reopened to world trade.

POTATOES: Improvement

The potato market situation is expected to improve now that the heavy marketings of the intermediate crop have been completed. The intermediate crop totaled about 35.4 million bushels, compared with 27.6 million bushels in 1939. The late crop now being marketed has been indicated at 290 million bushels, or about the same as in 1939, but about 6 million less than the average for the 10 years 1929-38.

Late potato crop supplies are likely to be larger this year than last in the

Eastern States, but smaller in the Western. The supply in the Central States is expected to be about the same as in 1939. BAE says that with somewhat higher consumer purchasing power in prospect for the whole of the 1940-41 marketing season, the late potato marketing season is likely to be slightly more favorable to growers than that of 1939-40.

TRUCK CROPS: Supply

In late August it appeared there would be ample supplies of most of the commercial truck crops for fall markets. Production of late onions in the northern States was indicated at about 15 percent smaller this year than last, and of lettuce, cantaloupes, and tomatoes 2 to 3 percent less. Most of the other late crops were expected to be in somewhat larger supply than in 1939.

A domestic cabbage crop (part of this is usually used for kraut manufacture) about a third larger this season than last was indicated in the late States, and it was reported that the late Danish type acreage would be about 3 percent larger. Market garden areas in northern States were providing considerable quantities of fresh vegetables in August. The general level of prices of truck crops early in the month was slightly higher than at the same time last year.

Larger crops than a year earlier of vegetables for processing were being harvested. Contract prices were slightly higher than in 1939.

FRUITS: Ample Supply

Total production of fruits will be slightly smaller this year than last, but the supply available for fresh market during the 1940-41 season will be about the same on account of reduced exports, canning, and drying. It is estimated that a decrease of about 12 percent in production of deciduous fruits will be offset in part by larger

crops of citrus. Prices of most fresh fruits were averaging higher this August than last—notably the prices of early apples, peaches, and citrus.

Production of apples in 424 commercial counties the country over was indicated at 117 million bushels, compared with 143 million in 1939, and with 122 million average in the 5 years 1934-38. The peach crop in the 10 early States turned out to be larger than had been expected, total production of pears was indicated at 31.4 million bushels, compared with 31.0 million in 1939, and of grapes at less than 2.5 million tons, compared with slightly more than this quantity last year.

MILK: Higher Priced

Farmers have been averaging slightly higher prices for milk this summer than last. Principal reason has been the better consumer demand for milk and for manufactured dairy products. This situation is expected to continue during the remainder of this year. Milk production during the last half of 1940 may set a new high record for this time of year, but consumer demand is expected to average higher than in the last half of 1939, and exports of dairy products are increasing,—notably of evaporated and condensed milk.

Milk production in the first 6 months of 1940 totaled slightly more than 57 billion pounds, or about 1.5 percent more than in the like period of 1939. Most of the increase went into manufactured dairy products. Production of butter, cheese and canned milk—combined—in the first 7 months of 1940 was 3 percent larger than in the like period of 1939. These developments reflect a marked increase in the foreign demand for concentrated milks, and a reduction in United States imports of cheese. Total imports of cheese during the first 7 months of this year declined by more than 5 million pounds.

EGGS, POULTRY: Up

Prices of eggs are expected to average higher this fall and winter than last. Production will be smaller, consumer demand should be better. Discontinuance of Government buying of eggs was announced in late August. About the same number of layers are on farms as at this time last year, but there are 10 percent fewer pullets to replenish laying flocks. Laying flocks will be about 5 percent smaller this winter than last, the exact decrease depending on prices of eggs and feed during the next few months. The feed-egg ratio from the producer's

viewpoint probably will continue less favorable than the 10-year average during the remainder of this year.

Higher prices of chickens also are expected, reflecting smaller supplies of chickens, higher consumer incomes, and the generally favorable chicken-storage deal of the past season.

* * * Not so favorable is the outlook for turkeys. Production of turkeys is smaller this year than last, and consumer demand should be better; but stocks of turkeys still in storage are the largest on record and last season's turkey-storage operations were unprofitable.

—FRANK GEORGE.

INCOME FROM MEAT ANIMALS

Cash farm income from meat animals totaled 2,276 million dollars in 1939. This compares with 2,175 million in 1938, and with 2,330 million dollars in 1937. Except for 1937, the income from meat animals in 1939 was the largest since 1930 when the total was 2,480 million dollars.

Practically all of the increase during the past year was in income from cattle and calves. A slight increase in marketings and an average gain of 50 cents per hundredweight received by producers for these animals raised the 1939 income to 1,275 million dollars as compared with 1,144 million in 1938. The 1939 total for cattle and calves was the largest in more than a decade.

Income from hogs totaled 821 million dollars in 1939, compared with 869 million in 1938. Marketings of hogs had increased during the past year, but farm prices averaged \$1.50 lower than in 1938. Income from hogs has declined steadily in the last 3 years, but the total for the last year

of record was nearly double the low figure of 445 million dollars in 1932.

Cash farm income from sheep and lambs was higher in 1939 than in 1938, and except for 1937 was the largest in 10 years. As in the case of cattle and calves, and hogs, the 1939 income from sheep and lambs was approximately double the low for the decade. The accompanying table gives totals and components by years for the decade.

Cash Farm Income From Meat Animals, 1932-39

Year	Cattle and calves	Hogs	Sheep and lambs	Total all meat animals ¹
	Mil. dol.	Mil. dol.	Mil. dol.	Mil. dol.
1930-----	1,184	1,136	161	2,480
1931-----	838	774	130	1,742
1932-----	621	445	93	1,158
1933-----	599	524	104	1,228
1934-----	815	521	131	1,467
1935-----	1,062	671	156	1,889
1936-----	1,098	965	170	2,233
1937-----	1,215	923	192	2,330
1938-----	1,144	869	162	2,175
1939 ² -----	1,275	821	180	2,276

¹ Total unrounded numbers.

² Preliminary.

Agricultural World of Tomorrow

IMPORTANT technological developments in the years to come seem reasonably certain to lead to a number of primary changes in American agriculture. These changes include a continued rapid increase in the adoption of tractors, especially the small general-purpose tractor with rubber tires. A further use of small combines, corn pickers, and other harvesting and tillage equipment operated with tractors is also in the picture. There will be a rapid extension of rural electrification, especially if support of the Rural Electrification Administration is continued as in 1940.

Other changes include a slow but constant improvement in the productive efficiency of livestock, and progress in the correction of nutritional deficiencies and in disease control. A tendency toward considerable increases in corn production is apparent as a result of further adoption of hybrid seed. Some increase in the production of wheat and oats is likely as a result of wider adoption of new disease-resistant varieties. Greater acreages of soybeans for seed production are in prospect, resulting partly from better seed-yielding varieties, partly from improved methods of harvesting, and from the development of new industrial outlets.

EXTENSION of flax and grain sorghums into new producing areas as a result of the breeding of cold-resistant and hardy varieties is a part of our agricultural economy of tomorrow. Another is the continued shifting from small-grain and tillage crops to forage and pasture in the interest of soil conservation; also, a continuation of the shift from low-yielding to high-yielding hays. Greater use of cover crops and other cultural and engineering conservation practices may be expected; and some increase in the production of corn and cotton as a result of greater use of cover crops in the South.

Techniques in the production and distribution of farm products have changed greatly in the last 20 years. New varieties of crops and breeds of livestock have been developed; many of the processes of production and distribution have become mechanized. Many of the present-day problems in agriculture stem from these developments.

Techniques will change more in the years to come, and with continuing far-reaching effect upon our national economy. What will be the extent of these developments? What their possible economic and social effects? How cushion or minimize their possible adverse effects? How distribute their beneficial ones?

A comprehensive study of these questions has been made during the past year by an Inter-bureau Coordinating Committee consisting of representatives of all the directly interested bureaus and agencies of the United States Department of Agriculture. This issue of "*The Agricultural Situation*" contains a group of articles abstracted from the Committee's report, "Technology on The Farm," published by the Bureau of Agricultural Economics.—Ed.

Other prospective changes include an expansion in the use of domestic wood pulp and increased attention to forests and wood lots as sources of supplementary income for farmers. Greatly increased use of frozen packing of farm products is likely, and continued advances in the production of synthetic textile fibers are expected. Wider outlets and use of both the edible and the drying oils, and development of starch production from sweet-

potatoes on a commercially important scale are additional possibilities. Some development of plastics and other industrial products from cellulose and protein—using mostly wood as the source of cellulose, and soybeans and casein as sources of protein—are other possibilities.

EXPECTED shifts in tenure and income raise difficult questions, since these entail loss of position and income and a progressive piling up at the lower end of the social scale—and that most likely in areas of lowest agricultural productivity, where the existing population is already in excess. This intensification of population pressure is certain to accelerate population movement. There will be an increased tendency to migrate between rural areas and between rural and urban areas. Machines alone are expected to displace 350,000 to 500,000 additional farm workers.

The important (but not new) problem of maintaining farm prices and income will be intensified by the expected technical developments. Significant increases of crops and livestock cannot come without serious repercussions upon costs, prices, and income of all farmers, but especially commercial producers. These changes, furthermore, will not take place uniformly throughout the country.

Another effect is due to the influence of mechanization upon size of farm and the relation of this to the availability of farms for tenants. A few years ago, a farmer upon retirement would go to a town and rent his farm as a unit to a bona fide tenant, but now he is more likely to stay on the farm and rent it by fields to his neighbors, who thus

increase the size of their operating units. Machines help them operate the additional acreage practically as efficiently as if it were a definite part of their home tracts. They stand to enlarge their operations and incomes thereby, but there is one less farm for some other tenant.

Closely related to this development is the influence of mechanization and acreage adjustments upon the shift from a position as tenant and share-cropper to one as wage hand. The problem may become even more intensified in the next few years.

IN the absence of a large defense program, industrial opportunities would not be likely to be of such magnitude as to absorb anything like the present industrially unemployed, to say nothing of absorbing the large excess of manpower on the farm. Nor are the prospects much brighter for the years ahead. A prolonged European war might alter this prospect, but only temporarily. A short war, on the other hand, might make it even darker. Even when peace is declared a period of years will be required to overcome the maladjustments resulting from the war. There will be extreme competition among all nations for world markets. Because of the major importance of foreign markets to the prosperity of the bulk of our agricultural producers, it appears that agriculture as a whole will be affected particularly by this situation. Agriculture will be benefited, however, to the extent that our domestic industrial economy can be made to function more effectively through expanded production, lower prices, and increased employment.

Technology . . . is a social and economic force that challenges thought and ability to plan, because its many-sided nature combines the intricate influences of getting and spending, savings and debts, employed leisure and unemployed relief.

—BAE Report "Technology on the Farm."

Problems of Mechanization

IN a few years striking advances have been made in the use of farm machinery. Reasons for these changes are many. Competition within their own areas and with other sections of the country led many farmers to use machines. Some bought equipment to keep sons on the farm. Borrowing and going into debt was easy. Some sought a release from routine. For some, machinery meant independence from hired labor, an attempt to lower production costs, increased efficiency, and greater marketable production.

The years of expansion, new frontiers, virgin lands, easy money, free spending, high prices, ready employment, and drives for greater production brought tractors, new cultivators, harvesters, and other mechanical aids to farming. The most important of these is the tractor. From the heavy, cumbersome machine, limited to draft work and certain belt operations, the trend has been to lighter, higher-speed tractors adapted to various uses. Further modifications in design are expected; the immediate future is likely to bring greater use of small tractors on small farms.

AN estimated 1,626,000 tractors were in use in the United States in 1939—almost double the number reported in 1930. Three-fourths of all tractors sold in the United States in 1937 were general-purpose tractors; it is probable that 50 percent of all tractors on farms in 1940 are of this type. A growing proportion has rubber tires. Probably 60 percent of American farms large enough for motor equipment are using tractors this year.

The largest use of tractors is in the small-grain areas, the Corn Belt, and specialized sections such as the dairy, truck, and orchard areas of the Eastern and Western States. In the Southern and Eastern States, small farms and low incomes have not favored the purchase of tractors, but some large specialty farms have been mechanized.

The small, all-purpose tractor should increase the rate of mechanization of small farms in these regions. This machine, also adapted to the small farms of the North Central States, may offset a tendency there to combine and enlarge family-operated units. In the small-grain areas, more nearly mechanized than any other, the small tractor may displace horses on small farms.

It seems conservative to assume that a continuation of present conditions would result in an increase of about 500,000 tractors by 1950. A considerable slowing down of tractor adoption in the North Central and North Atlantic States and an acceleration in the other regions are indicated on the basis of a more rapid acceptance of the new small tractors in areas of smaller farms.

More farmers could buy tractors in a shorter time if prices of farm goods stimulated adjustments in the type of farm power as an aid to increased production. On the other hand, low farm incomes or greater restrictions on the use of cropland would slow down the rate of adjustment.

THE combined harvester-thresher is the most important development in harvesting equipment. New types are adapted to harvesting grass seeds, soybeans, and small grains. Less than 5 percent of the wheat crop was harvested with combines in 1920, but approximately 50 percent of the crop was "combined" in 1938. The "baby combine," introduced in 1935, cuts a swath 5 or 6 feet wide, is driven by a power take-off from a tractor, and can be operated by one man, at 4 to 5 miles an hour under favorable conditions.

The "midget" combine, that cuts a 40-inch swath and is operated by one man, came into use in 1939, primarily on small farms. It costs little more than a grain binder, is built for speed in operation, and may give to the small farmer an advantage in harvest costs

heretofore held by operators of large holdings. In 1939, 80 percent of the combines sold were 6 feet or less in width.

Mechanical corn pickers on the market in 1940 seem to be economical only for harvesting large acreages, but a simplification of design to lower the initial cost may extend greatly their use. A small, low-cost picker would tend to discourage the concentration of corn acreage in large units. With a two-row picker and modern facilities for hauling and cribbing corn, yields of 60 to 70 bushels an acre can be harvested with only 1½ to 2 man-hours an acre. Hand picking and scooping would require 9 man-hours to harvest a 70-bushel yield.

More than 800 patents have been taken out on cotton harvesters, but none (except that of the stripper type) is considered beyond the experimental stage.

SCARCELY more than 100,000 rural homes received current from electric power lines in 1919, but by June 1940, service had been extended to approximately 2 million farms, or about 29 percent of American farms. The proportion of farms receiving current at the end of 1939 varied from 78.5 percent in the Pacific States to 10 percent in the West South Central States.

Some 250 farm uses of electricity have been listed. The total annual amount has been apportioned in this way: 40 to 50 percent for irrigation; 30 percent for household appliances; 20 to 30 percent mainly for lighting barns, yards, and out-buildings, but some for small equipment like pumps, chick brooders, and milking machines.

Rural electrification has been rapid, the number of farms receiving electricity increasing about 25,000 a month. At this rate, all the farms in the United States would be electrified within 15 to 20 years. However, the sparseness of population and the extremely low incomes of farmers in

some areas may prove to be obstacles to electrification, unless financial aid is granted to farmers in such areas. Nevertheless it seems reasonable that a total of 3 million to 3.5 million farms—45 to 50 percent of all farms—will be receiving electricity from power lines within the next 10 to 15 years.

BETWEEN 1915 and 1939, motor equipment displaced nearly 10 million horses and mules on farms. This reduction of work stock released, either for direct sale or for the feeding of other livestock, the products of some 30 million acres of cropland and 15 million acres of pasture. A continuation of the downward trend in horse numbers must be expected.

A recent study estimated one tractor had taken the place of two and one-half horses. Such displacement tends to be directly proportional to size of farms and size of tractors. But fewer working livestock would mean fewer horse and mule colts, and the total reduction in numbers of horses and mules would probably be about three head per tractor.

On this basis, an increase of 500,000 tractors in the next decade would replace approximately 1.5 million head of horses and mules. On the basis of estimated feed requirements of horses and average yields in 1928-32, the acreage thus released for uses other than production of horse feed would approximate 3.5 million acres of grain crops, 2.3 million acres of hay, and 2.4 million acres of pasture. Roughly, the volume of production to be diverted would be the equivalent of 56,000,000 bushels of corn, 20,000,000 bushels of oats, 2,660,000 tons of hay, and 91,000 tons of other concentrated feeds.

Too few colts were being raised in 1940 to sustain even the number of work stock that would be needed after the estimated 1.5 million head had been replaced by tractors.

MECHANIZATION may be expected to increase somewhat the total investment in equipment on farms compared with the investment that would be required if horse operations were maintained. This will mean an increase in the fixed costs of the farms making such shifts. The changes in equipment, however, are likely to have less important effects on the total farm investment. In 1930, the value of land and buildings made up 84 percent of the value of farm property. Machinery represented only 5.8 percent of the total valuation. Tractors, trucks, and automobiles reduce the number of horses and displace horse equipment; therefore, they do not increase farm investment in proportion to their total cost. For instance, the investment in tractors and equipment on a mechanized cotton plantation of 950 acres would be approximately the same as the investment in mules and mule equipment for operating with animal power. On small farms mechanization would probably increase the investment; the amount depending on the number of animals that could be displaced.

Mechanization in the North Central States has apparently increased the investment in equipment and power. On farms of 135 to 174 crop-acres using horse power in 1937, the investment in power and equipment averaged \$1,640, and on farms of the same size group using general-purpose tractors the investment averaged \$2,192. Part of this difference can be accounted for by the tendency to have newer and more expensive equipment on farms using tractors, and by the likelihood that some horse-drawn equipment was still carried in the inventory.

More important than the actual increases of investment in equipment for the ordinary farm is the fact that farming an acreage less than that efficiently handled by a particular set of equipment leads to excessively high machinery costs.

IT is estimated that 350,000 to 500,000 farm workers will be displaced in the next decade, but the number of workers displaced by mechanization depends not only on the type of equipment but also on the kind of farm. Displacement is not necessarily in proportion to the time saved on a specific job. On large farms operated with a flexible supply of hired labor, equipment that reduces the time of performing work by half may at the same time reduce the working force by half. But on the family farms the labor force represented by members of the family may not be reduced by labor-saving equipment. Less additional labor may be hired, but the actual reduction of workers would be considerably less than the working time saved.

The influence of changes in equipment on the use of labor is more apparent when it is expressed in terms of the labor required to handle crops with different sets of complementing equipment, or in terms of the labor required to operate a farm of a given size and type with different sets of equipment. For instance, with the machinery and power in common use in the central winter wheat areas about the year 1900, the approximate time to prepare land, seed, harvest with a binder, shock, thresh, and haul wheat to the granary was 8.8 hours per acre. With the use of a tractor, tractor equipment, and a 12-foot combine, the time for comparable work was reduced to 3.3 hours. The time required for corn production in the Corn Belt was reduced from 15.1 hours to 6.9 hours an acre.

In the Corn Belt a shift to tractors, and to some extent to combines, reduced labor requirements for wheat nearly 5 hours an acre. One of the factors influencing the reduction in man-hours used per acre of other important crops is a gradual shifting of production to areas where less labor is used. This has been most pronounced in wheat and cotton.

NO mechanical developments now under way seem likely to affect the use of labor in the near future as drastically or on as large a scale as did developments in wheat machinery in the 1920's. However, perfection and adoption of the cotton picker or the use of sugar-beet tillage and harvesting machinery would have effects comparable to the recent mechanization of wheat production.

Although the small tractor placed in service on a livestock or general farm would reduce the time required for field labor, the usual adjustment of increasing the numbers of productive livestock as work stock are displaced would tend to maintain the total amount of labor used. Labor displacement in cash corn areas seems likely to continue, and in the cotton areas it may be large in proportion to the degree of mechanization.

The traditional plantation and sharecropper systems of farm organization in parts of the South are passing even without the mechanical cotton picker. Prices of cotton and wages of labor have given an income advantage to the operators using hired rather than share labor. The result has been an increase in the proportion of cotton grown with wage labor. This has been particularly true where additional economies in cost of operation could be achieved through the use of wage labor and power machinery.

On the plantations shifting toward mechanization during 1932-38, 36 tractors were put into use for each 10,000 crop acres; 91 families, or 22 percent of the original number, were displaced from 10,000 acres of crop land. The second group, on which tractors per 10,000 crop acres increased from 18 in 1932 to 24 in 1938, displaced 65 families, or 16 percent. The third group, on which tractors were not

used, displaced 22 families, or 6 percent.

The introduction of tractors in the South will release for other purposes land that has been used for corn, hay, and pasture for mule feed. Most of this land has grown corn. It may continue to grow feed for other livestock, but some of it may be shifted to cash crops. The relative profitability of the different alternatives and the extent to which special inducements are provided for shifting will determine the choice.

FURTHER adoption of tractors and complementary equipment in the North Atlantic States will release land formerly used to produce feed for work stock and make it available for other uses. In view of the importance of dairying and the relative shortage of feed crops, it seems likely that a large part of the released land will be used to produce feed for dairy cattle.

The probable shift to more dairy feed resulting from mechanization must also be relative to the adoption of soil-improvement practices. The agricultural conservation program appears to have encouraged dairymen to step up the normal rate of adoption of soil-improvement practices. In other words, the conservation program seems to be hastening a desirable adjustment, but it is an adjustment which means more dairy feed. Increased use of lime and fertilizer is bound to affect hay and pasture yields over a period of years.

What are the implications of such changes? Will it mean too much milk? Will farmers really adjust their rations to take advantage of increased home-produced feed? Perhaps not, for some recent farm records indicate that dairymen are slow to adjust their purchases of grain when more roughage is available.

Plants and Production

CORN is the most valuable of all farm crops in the United States. Hybrid corn, with its additional security against low yields and crop failure, is an outstanding achievement. In 1933, about 40 thousand acres were in hybrid corn in the United States; 6 years later approximately 24 million acres were grown—roughly one-fourth of the national corn acreage. About 55 percent of the total corn acreage in Ohio and Illinois and 75 percent in Iowa were in hybrids in 1939.

Probably 80 to 85 percent of the corn acreage eventually—perhaps before 1950—will be planted to hybrids in the Corn Belt. Further expansion will be limited by low soil productivity in some areas where the hybrids have too slight an advantage over open-pollinated corn. In parts of the Great Plains where yields are limited by too little moisture, the returns from hybrids may not justify the extra expense. All factors considered, the grain sorghums are more dependable for some of these places.

The development of corn hybrids for the South has not been neglected, but those now under trial may not be ready for extensive distribution among southern farmers before 1945. Rather slow adoption of hybrid corn in the South seems to be indicated because of the greater cost, relatively low yields, and the fact that corn is not a southern cash crop.

AN important characteristic of hybrids is their increased productivity, for yields sometimes exceed those of open-pollinated varieties by 15 to 30 percent. Another is increased "standability," of especial value when mechanical corn pickers are used. Some hybrids resist disease, and several are somewhat immune to chinch bugs and corn rootworm. Plant breeders estimate increases in yields of 15 to 20 percent from using hybrid seed under field conditions.

If hybrid corn were planted on 80 percent of the corn acreage of the North Central States and 40 percent of the corn acreage elsewhere, and the hybrid yields exceeded yields of open-pollinated varieties by 15 percent, the corn production would be 273 million bushels greater than production calculated by multiplying the average yield of 1923-32 by the average harvested acreage of 1928-32. If the 1939 harvested acreage is used and the other assumptions remain the same, the corn crop would be 221 million bushels greater.

On the basis of the corn acreage harvested in 1938, or the smaller acreage in 1939, it seems conservative to estimate that the use of hybrid seed will add at least 220 million bushels to our total corn production. Perhaps a little more than half of this increase has already been obtained.

IMPROVEMENTS in wheat have served to meet an increasingly unfavorable situation; wheat yields and quality have been maintained despite depleted fertility, increasing pests, and extension of production into high-risk areas.

An outstanding achievement has been the development of Thatcher, a hard red spring wheat that possesses greater resistance to stem rust than other varieties. Grown on some 20,000 acres in 1935, it was found to be less susceptible to stem rust than either Marquis or Ceres in the epidemics of 1935 and 1937. Thatcher wheat has become extremely popular; some persons are of the opinion that the acreage planted to Thatcher in the next few years will fluctuate around 6 million acres, or approximately one-third of the spring wheat acreage. On the assumptions that 2 or 3 severe epidemics of stem rust will occur every 10 years and that Thatcher will yield, as an average for all years, 1.3 bushels an acre more than Ceres and 3.3

bushels more than Marquis, the substitution of Thatcher wheat on 6 million acres would result in an annual increase of 10 million bushels.

riety communities have been increased as much as 40 to 50 pounds of lint to the acre, although a part of such increases is due, of course, to better cultural practices and better seed.

Recent experimental work has established flax production in California and Texas. Punjab flax, grown chiefly in the Imperial and San Joaquin Valleys of California, has displaced some cotton since 1935; in 1939 about 100,000 acres of this flax produced some 2 million bushels of seed. About 17,000 acres of fall-sown flax were grown commercially in Texas in 1938-39, chiefly near the Gulf coast in the triangle represented by Houston, San Antonio, and Brownsville.

SOYBEAN production for seed has grown phenomenally. It is one of the most promising crops from the standpoint of furnishing raw materials for industrial uses.

The soybean was introduced into the United States in 1804, but received little attention for a century. Only 50,000 acres were grown in 1907. The recent rapid increase may be attributed to the development of high seed-yielding varieties, to improved harvesting equipment, and to new industrial outlets for the product.

The North Central States led in soybean production in 1939. An addition to the soybean acreage in these States would mean a reduction in the acreage of other crops—particularly of oats, wheat, and corn—to an extent that depends upon the relative profitability of each crop. Soybeans may not displace any material acreage of corn in the Corn Belt, unless such a shift is induced by agricultural programs, but there is a strong likelihood that they will displace some wheat and oats. Increases of 15 million to 20 million bushels above 1939 soybean seed production could easily take place. Farmers in these States have sufficient power and machinery to handle more acres of soybeans, and oil and oil-meal processing plants are available as outlets.

IT is expected that the supply of grains will increase. No doubt the additional corn production resulting from the use of hybrid seed in the Corn Belt was a factor in bringing about the need for a lower allotment acreage in corn for 1940 in the Agricultural Adjustment Program of the Department of Agriculture. Reduction of the corn acreage may offset the potential increase in production resulting from hybrid corn and thus assist the corn-loan program in maintaining corn prices—but the effects of hybrid corn are not entirely removed. Further reduction of the acreage in corn will free additional acreage for soil-conserving crops or pasture.

The total supply of roughages will increase and the prices of roughages relative to corn prices may decrease. Roughage-consuming livestock under these conditions probably will receive more roughage and less grain, and the production from this type of livestock will tend to expand relative to the acreage in corn. If the demand for livestock products does not expand with the new livestock production, the prices received by farmers for these products will tend to fall.

The maintenance of corn prices at too high a level as the prices of live-

THE most important development in cotton improvement is standardized production in single-variety communities—a procedure whereby all farmers of a locality grow one improved strain of cotton. In 1939 there were about 1,500 single-variety communities; these accounted for approximately 13 percent of the cotton crop. Yields in some single-va-

stock and livestock products decline accentuates the substitution of cheaper feeds for corn, and may bring forth

new ways of making livestock production more efficient in the use of grain.

Changes in Animals

AMERICANS have changed their mode of living. They have new appetites and knowledge of nutrition. Their work has become more sedentary and less physical, and permits the use of food of lower caloric value. Reducing diets have cut the farmer's market for animal fat. Kerosene was substituted for tallow candles and in turn is being replaced by electricity. Hydrogenated vegetable oils compete with lard. Smaller families have meant a smaller demand for large roasts and large turkeys. Hogs and cattle are bred and fed so they will have more lean meat and less fat.

These are but some of the changes in market requirements and, indeed, in animals themselves; in addition new and basic techniques have been developed. New knowledge of pests and germs and minerals is widely used in controlling animal diseases. Research in animal feeding is directed toward learning the importance and use of vitamins, minerals, forage, pasture, hay, and silage in rations and the effects of processing and storage on feeds. Much of this work has preceded studies in human nutrition. Some areas are known to lack iodine, calcium, phosphorus, cobalt, copper, or iron, and methods have been devised for correcting these deficiencies.

A COOPERATIVE campaign inaugurated in 1917 to eradicate tuberculosis among livestock has been highly successful. Nearly all dairy and breeding cattle in the United States have been tuberculin tested. Paratuberculosis, Bang's disease, and mastitis are the most important diseases affecting American cattle. No

satisfactory control methods, except testing and slaughter, have been devised. Sometimes even this method has failed, mainly because of inadequate tests. The campaign against the cattle fever tick has succeeded in reducing the area under Federal quarantine to 15,000 square miles in Florida and Texas, compared with approximately 700,000 square miles under quarantine in 1906, when the campaign was undertaken.

Progeny testing has been most widely used with dairy cattle. Production records were kept on about 2½ percent of all dairy cows in the United States in 1939. Since 1927, dairy herd improvement association records have been used to prove sires; since 1936, the practice has been expanded and made more accurate.

ALTHOUGH the droughts of 1934 and 1936 reduced the production of milk, the estimates reveal a fairly consistent upward tendency in individual production per cow, averaging about 25 to 30 pounds of milk a year. A large part of this gain is probably the result of the heavier feeding encouraged by the higher butterfat prices relative to prices of feed concentrates in most of the post-war years. Progeny testing no doubt will accelerate the upward trend in such production, but its effect will be relatively small until it is widely adopted as a basis for culling.

Poultry breeders use progeny testing to obtain strains of poultry superior in egg production, egg weight, and body weight, but farmers who are not specializing in poultry have found that too much work is required for the necessary trapnesting and record keep-

ing. For other types of livestock, extensive programs of progeny testing remain to be developed. A program to improve swine has been successful in Denmark for more than 40 years, but in the United States the process has been limited to experiment stations and the Department of Agriculture.

CROSS-BREEDING involves the mating of animals of different breeds or species. Brahman cattle from India are crossed with beef breeds of British origin to get a quality beef animal that can withstand the high temperatures, humidity, and insect infestations along the Gulf Coast. There has been an increasing demand for Brahman cattle in the South. It is estimated that at least 500,000 head—about 20 percent of the cattle along the Gulf Coast area—show Brahman breeding. The greatest technical limitation in cross-breeding beef cattle is the necessity for constant crossing.

Experimental cross-breeding of swine indicates that cross-bred pigs require about 5 percent less feed for the same amount of gain and about 5 percent less time to reach maturity than do pure-breds. At the same time they yield better carcasses. Cross-breeding of sheep of the wool-and-mutton type has produced such breeds as the Columbia and the Corriedale. Because of the change in the relative values of wool and mutton, cross-breeding has increased since 1930. It is estimated that approximately 10 percent of the range sheep were involved in cross-breeding in 1939.

ARTIFICIAL insemination—the act of inserting semen into the female mechanically—permits the use of proved sires on more females. The technique has been well developed, although further improvement can be expected. Effective use requires adequate equipment handled by well-trained operators. The practice is used with various degrees of success among cattle, horses, foxes, sheep,

swine, and poultry. Seventeen artificial breeding associations for dairy cattle were functioning in 1939 in 10 States.

By extending the use of proved sires over several hundred females a year instead of 25 or 50 in a single herd, faster improvement can be made in the quality of the entire livestock population. Because the cost of cooperative purchase of a good sire, added to that of collecting and transporting semen, will tend to offset the amount that farmers otherwise would spend for more sires and for feed, the total cost for breeding probably will not be changed materially. (It should be emphasized that results of the work in livestock improvement affect production rather slowly, and that therefore the necessary adjustments usually can be made as the improvements themselves take place.)

As a result of mechanization, changes in cropping systems and the release of feed crops for meat and milk animals probably will have a much more important immediate effect on the volume of livestock products than the improvements in breeding and care of animals. The latter are effective particularly in enabling farmers more efficiently to utilize, through livestock, the increases in feed produced.

THREE is meager evidence concerning the gains in efficiency from using grains for livestock production and the extent to which the various roughages and feed grains are substituted for each other in feeding livestock. Obviously, the shifting back and forth between grains and roughages is greatest for cattle, particularly beef cattle. Yet a study of the cost of producing hogs in Champaign and Platt Counties, Ill., during 1920-38 shows a greater use of pasture and a decline in the quantity of grain fed for each 100 pounds of live weight produced. The quantity of grain fed for each 100 pounds of live weight fell from an average of 508 pounds for

1920-24 to an average of 434 pounds in 1934-38, while days on pasture increased from 7 to 46. At the same time, proteins fed increased from 7 pounds to 19 pounds.

The quantities of grain fed annually to cattle and horses on Iowa farms between 1923 and 1932 seemed to vary between 40 and 60 bushels per head. Whether there has been a significant increase in the efficiency of feeding grain to livestock for the United States as a whole cannot be clearly determined. If the amount of grain estimated to have been fed during a year to all livestock, including workstock, is related each year since 1909 to the amount of grain estimated to have been required at average rates of feeding for the yearly livestock production, no great change in the amount of feed consumed relative to the requirement is indicated. In other words, the average rate of feeding for all livestock seemed to be about the same in the period 1909-14 as it was during 1937-39.

EXPANSION in the production of roughages is likely to increase the possibilities of substituting roughage for grain. So long as the corn-hog ratio is favorable for the feeding of hogs, a reduction in corn acreages probably will be offset in part by the feeding of less grain and more roughage to roughage-consuming livestock and thus diverting corn either to hogs or to the market.

If the prices of livestock relative to the prices of corn become too low for the feeding of corn, the existence of larger supplies of higher-quality roughages makes all the more possible the shift from corn. If the prices of corn persist at this relatively high level, the total requirement for corn may become less. Roughages will be utilized more effectively in maintaining the same livestock production with less corn. Larger numbers of livestock will be marketed at the weights that give the maximum gain from a given quantity of grain.

Eventually, livestock numbers may be reduced, even if temporarily. It is possible that if high prices of corn are prolonged, the average grain requirement for livestock production may decline. Thus technological developments pose problems for the corn-loan program.

An increase in the production of livestock and livestock products will, of course, exert a downward pressure on prices. There would then be a reduction in their total market value, since the character of the demand for most of these products indicates that a smaller volume of production and sale by farmers gives a larger total return than does a larger volume. Furthermore, the decrease in the rate of population growth intensifies the effects that increases in production will have on price. Although there are unsatisfied demands in our population, some sort of financial assistance may be required to make these demands effective.

THE effects of technological developments in the North Central States will differ greatly as between the effects in the Corn Belt and the Great Lakes dairy areas. The latter are too far north to compete in corn production, and have few alternatives to dairy farming if they are not adjacent to special markets. Hence, they are mainly dependent upon the long-term price outlook for manufactured dairy products. New developments that reduce costs in dairy farming will affect these areas favorably unless lower prices intervene.

Increased dairy production elsewhere (that is not offset by increased demand) constitutes the greatest threat to farm income in the dairy areas of the Great Lakes States. One means of meeting such a threat would be to feed less concentrated feed and relatively more roughage and pasture. Such an adjustment would utilize more effectively the natural competitive advantages of these areas, but the

shift would be accompanied by a definite increase in the quality of the roughage to prevent losses in milk production.

A companion problem is the probable effect of the conservation programs on dairy production in the Midwest, and on the supplies of grain feeds that farmers in the North Atlantic States must buy. Preliminary studies indicate that these programs by themselves will not greatly increase dairy production in the Midwest. In

fact, dairying in the Corn Belt increases more rapidly in depression periods—when corn, hogs, and beef cattle are selling at distress prices. Potentially, the Corn Belt is a formidable competitor in dairy production, but this competition will not become a reality so long as corn, hogs, and beef cattle are more profitable enterprises. Greater competition may be expected from the Great Lakes States which have fewer alternatives.

Industrial Uses of Farm Products

CURRENT developments are adding slowly to the demand for agricultural products in industry, but the value of these developments to agriculture is still largely potential rather than actual. If the national income were to rise, several developments would have greater benefit for agriculture, for the production and consumption of many articles made from farm products would be greater. Besides, it would be feasible to promote many products that cannot profitably be introduced while the national income remains low.

The widespread use of an alcohol blend gasoline for motor fuel would require the use of a large area of land. Conversion costs, however, are far too high to allow competition with gasoline at present prices. Even though raw materials were free, the cost of alcohol would greatly exceed present gasoline prices. Until less expensive conversion techniques are discovered, or until the petroleum resources become scarce, no strengthening of agricultural prices can be expected from this industrial use—that is, in the absence of public subsidy.

EXPANSION of demand for wood-pulp produced domestically seems to be the most important development affecting the demand for cellulose from the farms of the United States. Al-

though domestic pulp has had to face the competition of the low-price, duty-free pulp from Canada and northern Europe, the new pulpwood plants in the South may provide higher prices in that region for wood suitable for pulp.

Agriculture may not be the basic source for textile fibers in the future. Rayon—world production was 1,900 million pounds in 1938, or nearly 60 times the 1920 production—which has replaced cotton in a number of uses, requires cotton linters and woodpulp as a source of cellulose. Nylon may cause much substitution; its substitution for cotton and rayon would directly reduce the demand for agricultural cellulose, and its substitution for silk indirectly may reduce the demand for the cotton produced in the United States, because a reduction in the imports of silk will make it more difficult for Japan to purchase cotton and other products in this country. This, together with the relatively minor substitution of rayon for cotton that is expected in the immediate future, may exert some downward pressure on the prices of cotton.

INDUSTRIAL demand for soybeans has been strong, and outlets probably will continue to expand. The acreage available for soybeans, however, is ample, and a reasonable expan-

sion of demand will probably not cause much increase in price. On the contrary, the production of soybeans may expand greatly at 1940 prices if the prices of corn and competing crops become relatively low, and thus exert a downward pressure on soybean prices.

The United States is the world's largest consumer and producer of fats and oils. The total annual consumption exceeds 9 billion pounds. Recent imports, except for the record year 1937, have averaged about 2 billion pounds a year. Exports of oils and oilseeds have averaged 200 to 300 million pounds, besides oils and fats exported as paint, soap, and finishes on manufactured products such as automobiles and refrigerators.

Approximately 67 percent of the fats and oils consumed in this country is used for food. About 42 percent of the 1938 consumption was of vegetable origin; and of this amount about 70 percent was accounted for by cottonseed, soybean, corn, peanut, and linseed oils.

It is these oils, animal fats excluded, which are most extensively produced on American farms. The products from which they are derived represent cash crops, and changes affecting their production and use are significantly reflected in farm incomes. Developments may come with respect to tung and corn oils, wheat-germ oil, and the uses of castor, sunflower, rape, sesame, and perilla oils. The interchangeability of various fats and oils in food processing and utilization makes it possible to substitute sources of supply when any single oil is not available. Less interchangeability is possible for soaps and drying oils.

TECHNOLOGICAL developments in the vegetable oil industry seem unlikely to increase the total demand for the vegetable oil crops in the next 5 to 10 years. The ease of substitution among the oils prevents the expansion of demand for many vegetable oils.

The possibility does exist, however, of increasing the domestic production of vegetable oils at the expense of imports from foreign countries. An increase in livestock production will add to the supply of fats and oils, and thus there may be some downward pressure on these prices.

Corn is the mos' important domestic raw material for starch, but only about 9 percent of the crop is used for all industrial purposes, including the production of starch. This apparently low percentage should be expected, for corn is primarily the Nation's feed crop. Sweetpotatoes seem to be a promising source of starch for some uses. Varieties grown primarily for starch have yielded as high as 400 bushels an acre, with 200 bushels representing an attainable average. At the latter figure, the starch production would be about 2,500 pounds per acre, compared with about 1,700 pounds from corn.

CELLULOSE—in the forms of cotton linters, cotton fabric, wood-pulp, paper, wood flour, and the like—is the agricultural material most important to the production of plastics. Proteins, of which casein from skim milk has been utilized in greatest volume, have had secondary importance. Considerable research has been directed to the development of a plastic from lignin-containing materials, such as wood, cornstalks, and sugarcane refuse. Interesting results have been obtained.

A plastic from soybean protein, requiring heat for molding and formaldehyde for hardening, awaits only the discovery of some means to make it fluid enough to be used in injection-type molders; once the means is discovered, this plastic should have commercial importance. There also appears to be a potential market of moderate size for other types of molding compounds containing soybean meal. Interesting plastic materials have been developed by the chemical conversion of lactic acid.

It appears that the recent rapid technical advances in the arts of making and using plastic compositions are likely to lead to continued growth of the plastics industry. The quantity of agricultural products required in such growth, while not inconsiderable, is still relatively small compared with the total supply of the products.

THE continued expansion of the canning of fruit and vegetable juices and the increased use of frozen-packing may have adverse effects upon fresh fruits and vegetables and canned products. Much of the expansion along these lines is merely a substitution of one product for another. The fruit juices tend to be substituted for canned and dried fruits and even for fresh fruits, such as grapefruit and oranges.

Frozen fruits and vegetables substitute for fresh products and for canned goods during the seasons when fresh fruits and vegetables are scarce or high in price. The canned goods packed for the "luxury" trade will probably feel the competition of quick-frozen products, but it is doubtful if there will be much substitution of the higher-

priced frozen products for the canned goods sold to lower income groups.

The prices of canned goods may be depressed, and thus the prices received by farmers whose only outlet is that of the canneries will be lowered. On the other hand, there may be some price stimulation in the areas well adapted to growing vegetables for freezing. This stimulation will probably be in the North. The South would lose a part of its advantage in producing for the off-season, high-price trade.

As frozen-packing becomes more developed and the problems of distribution of such products less difficult, the fresh vegetables of the off-season may have to meet the competition of an effective substitute. Prices then will tend to be lowered in the southern areas of production. The possibility exists, however, that some sort of seasonal price pattern will develop for the quick-frozen goods that will permit the processors to take full advantage of the high prices of the off-season. The development of an "industry consciousness" by the processors may lead to close cooperation in pricing. This would tend to reduce the competition between frozen and fresh products during the winter months.

Effects on Costs and Returns

MOST new techniques and improvements used in farm operations are adopted because it is expected that returns from their use will exceed the additional costs incurred. There is a complicated relationship between the adoption of a given improvement and its effect on farming costs. To analyze this relationship one must distinguish between "fixed" and "variable" costs and between "cash" and "noncash" costs.

The purchase of a tractor represents a large initial investment, and the machine is expected to last for several years. Once this investment

has been made, interest and depreciation represent fixed costs on a given farm; but the purchase of gasoline and oil, and the repairs incident to current use of the tractor, are variable costs in the sense that they vary in amount with the use of the machine. The latter costs are also cash costs of operation during the production period. If payment for the tractor is made in cash, its initial purchase is also a cash cost, but one on which returns are expected over a period of years. If money is borrowed to purchase the tractor, the interest and amortization charges on this debt occur as cash costs of operation.

IT is apparent that a shift from horses to tractors may greatly change the nature of farming costs. Fuel and oil are bought for cash in place of the horse feed produced on the farm. Thus, a larger proportion of the annual costs of farm power is cash, and the farm becomes less self-sufficient in furnishing its power. An improvement like a tractor that represents a large initial outlay and results in a fixed cost for equipment is likely to be adopted more slowly than one that affects only the variable costs, as does the use of hybrid seed corn.

It should be noted, however, that even the substitution of purchased hybrid seed corn for a home-grown, open-pollinated variety increases the cash costs of farm operation. There is also a further difference in that once a new tractor has been bought the fixed cost represented by this investment will retard adoption of a new type of tractor even though it represents considerable improvement in design. The cost of discarding the old machine enters into the calculation.

MECHANIZATION of agriculture may be expected to increase somewhat the total investment in equipment on farms, compared with the investment that would be required if horse operations were maintained. This will mean that the fixed costs of the farms making such shifts will be increased. The changes in equipment, however, are likely to have less important effects on the total farm investment. In 1930, the value of land and buildings made up 84 percent of the value of farm property. Machinery represented only 5.8 percent of the total valuation. Tractors, trucks, and auto mobiles reduce the number of horses and displace horse equipment; therefore, they do not increase farm investment in proportion to their total cost.

The evidence points to increased capital needs for agriculture, but an

increase probably not much greater than 25 percent of the working capital and 5 percent of the total investment. Whatever increase is made in the size of commercial farms will increase the required investment per commercial farm and will increase the difficulty that a farm laborer has in acquiring sufficient capital to begin tenant operations. On the other hand, an increase in the number of subsistence farms with smaller capital requirements would tend to prevent a large increase in the average investment per farm for the country as a whole.

The most significant change in farm costs will be an increase in the proportion which cash costs are of total farm costs. That the need for gasoline, oil, grease, and repairs for tractors will necessitate larger cash outlays than if horses were used and were fed home-grown feeds has already been mentioned.

QUITE transitory advantages from new techniques often become capitalized into land values. Adoption of the standard tractor and the prairie-type combine probably gave a temporary bulge to land values in some Great Plains areas in the 1920's. Mechanization probably has tended to enhance the level of land prices in the areas best adapted to it and to depress values in the areas not well suited to it, because of the competition which it has initiated among farmers to obtain the more level farms with large fields.

Since mechanization encourages an increase in the number of acres operated by individual farmers and is likely to cause some displacement of farmers, the competition for the better land may become keener. With farmers willing to pay more for the good farms, or willing to pay higher rentals for leasing them—in some instances even to the extent of sacrificing their level of living—it appears likely that mechanization may still exert a pressure toward higher land values in the

better farming regions, at least as a first stage in adjustment.

THE development of mechanical equipment especially for small farms and the probable greater demand for farms in the poorer agricultural areas (on the part of those farmers who cannot gain a foothold in the better regions, or who cannot find employment outside of agriculture) will probably work to maintain land values even in the poorer agricultural regions. (It is necessary to emphasize that such a tendency is dependent upon attempts of the displaced group to remain in agriculture because of the lack of better opportunities. Perhaps this can be characterized as the second stage in adjustment to the new situation.)

At a later stage, if net incomes from farming are considerably lowered by reduced prices, there will naturally be a tendency toward lower land values. Such a tendency is likely to appear even though other alternatives do not open

up for the displaced population, because a living for the farm family represents the first claim on farm income. How much land values will be affected depends in part on how tenaciously farmers will cling to their accustomed levels of living.

IN summary, one can say that technological changes will exert an upward pressure on land values in the stage when farmers' net incomes are increased. If this stage is accompanied by increased production which eventually results in lower prices, the upward effect may be only temporary and may cause greater distress in the low-priced period because of indebtedness incurred at a high level of land values. If no alternatives are open to the population that tends to be displaced through mechanization, the level of land values may be maintained for a time even under lower prices, but only at the expense of the levels of living of many farm families.

Effects on Regional Specialization

NOT all areas can adopt new techniques with equal facility. For example, certain types of mechanization can be used more easily on level land than on hilly land. Sometimes there are economic and social resistances to change. The impact of the different developments, therefore, is likely to vary, region by region, according to physical, economic, and social conditions within each region, and with the extent of change in competing regions.

Among the forces that are likely to have the most important effects on regional specialization are increased mechanization, the adoption of crop acreage adjustment and conservation programs, the use of hybrid seed corn, other plant improvements, and new ways to preserve foods.

INCREASED use of tractor power and complementary equipment intensifies the advantage in cotton production of level and more fertile areas that also have less serious conservation problems. Relatively greater specialization in cotton production than in the Cotton Belt generally is perhaps to be expected in the Mississippi Delta, the Black Prairie of Texas, western Texas, and Oklahoma.

A problem is the probable effect of the conservation programs on dairy production in the Midwest and on the supplies of grain feeds that farmers in the North Atlantic States must buy. Preliminary studies indicate that these programs by themselves will not greatly increase dairy production in the Midwest. In fact, dairying in the Corn Belt increases more rapidly in

depression periods—when corn, hogs, and beef cattle are selling at distress prices. Potentially, the Corn Belt is a formidable competitor in dairy production, but this competition will not become a reality so long as corn, hogs, and beef cattle are more profitable enterprises.

DEVELOPMENTS in the preservation by freezing of fruits and vegetables will probably intensify competition for the vegetable growers in the North Atlantic States who are depending for their advantage on nearness to large population centers. But there are probably certain areas with natural production advantages that will benefit.

The poultry industry in this region had developed close to the urban markets along the Atlantic Seaboard and has benefited from a period of relatively low grain prices. It has been influenced tremendously by a remarkable development in scientific knowledge of breeding, feeding, and control of disease. One cannot be certain, however, that the resulting regional advantage is permanent. To retain it means that leadership in new technical and economic developments must be held in this region.

These States have some areas well suited for fruit and vegetable production; these areas may benefit from developments in frozen packing. Cut-over areas may benefit from the development of markets for forest products. Such a development would make it possible to combine farming and forestry.

THE Corn Belt States naturally have been affected most by the use of hybrid seed corn. Further effects of this development in the next few years will have the most direct impact on these States, and to the extent that expanded production is not offset by acreage control, these States will produce an increased proportion of the total corn crop. The

combined effect of hybrid corn and the release of land formerly used for horse feed will mean a significant increase in the feed supply for meat animals unless offsetting measures are taken.

The crop-adjustment and conservation programs probably will tend to shift livestock production towards roughage-consuming animals such as grass-fed cattle and sheep.

IN the Great Plains the drought cycle has been so severe that many persons have asked whether any type or size of farm can be developed that will permit a farm family to survive prolonged drought periods on a self-supporting basis. Recent Government activity in the Plains has been directed toward answering this question. Survival will be aided by the further development of programs designed to conserve both human and natural resources by shifting some of the higher-risk dry-farming areas to less intensive grazing uses. Programs that encourage improved methods of reseeding will hasten the adjustment.

Even in some of the better areas a way will have to be developed for maintaining the organic matter in the soil in order to prevent soil blowing. In the Northern Plains, perhaps, this can best be achieved by seeding perennial grasses on a considerable part of the present crop acreage, leaving the land in grass over a period of years, and plowing it for crops only as rapidly as an equivalent acreage is seeded back to grass. A combination wheat-and-grass farm will require the addition of livestock to utilize the grass, and, therefore, raises the problem of feed supplies in dry years.

Eventually the indicated developments in the Great Plains probably will mean less wheat and more roughage-consuming livestock, largely beef cattle and sheep. Combined livestock and grain farming will be more prevalent. The mechanization of wheat

production is largely an accomplished fact, and adding livestock to the wheat farm would probably not mean less mechanization, but would accelerate the trend to larger farms.

If the more strictly ranching areas are to maintain their most important resource—grass—they must institute an effective conservation program.

THE most important effects of technological developments on the West Coast are likely to be felt in the commercial fruit and vegetable areas. Washington and Oregon produced about one-fourth of the total United States pack of frozen vegetables in 1938. This represents a tenfold increase in 5 years, and further rapid expansion appears probable.

The rapid development of frozen packing will mean that the areas of the

South and Southwest (including California) that now produce small fruits and vegetables for northern and eastern markets during the winter and early spring will lose an important part of their market outlet, unless they can remain in production at prices comparable to those prevailing when the products from the more temperate areas come on the market. The higher acre yields and smaller production expenses give the temperate areas an advantage that will increase the adverse effect of frozen packing on those areas now producing "out-of-season" fruits and vegetables.

On the Pacific coast, frozen packing is likely to favor the northern part of the region where it may furnish an alternative enterprise to distressed orchard areas.

Some Suggested Lines of Action

INSTEAD of preventing or slowing technical progress, we need to speed up and give new direction to social and institutional changes in order to keep pace with technological change. We need to spread the benefits of technology more widely. We need to encourage the development of new opportunities and greater security for all farm people, particularly the disadvantaged groups.

Inventions and technological progress have been a major factor in raising the standard of living of all the people. But it also has been recognized that these benefits have not always been distributed equally among all groups—that along with them have come certain maladjustments.

As long as our economy was expanding and domestic and foreign markets were growing steadily, these maladjustments were temporary. As the era of free land passed, however, as we have shifted from a debtor to a creditor nation, and as our ability to find or to

hold foreign outlets for our excess products has declined, maladjustments due to scientific progress have become accentuated.

THE measures proposed relate primarily to steps that might be taken within agriculture itself. It is not assumed that these are the only steps that need to be taken nor that they will in themselves relieve the existing maladjustments. In fact, even more urgent adjustments are needed in the nonagricultural segment of our economy. If such adjustments were made in the direction of greater freedom of enterprise, expanded output, lower and more flexible prices, there would be much less disparity of exchange between agricultural and industrial production and prices and there would be increased opportunity for the excess workers in agriculture to find gainful employment in industry.

First, we need to develop a program which will provide for the immediate

relief and rehabilitation of those now unemployed and in distress and which will absorb and cushion the shock for the additional numbers expected to be displaced. This calls for a conservation works program. Second, looking beyond the immediate situation, we need to develop measures for the permanent rehabilitation of these people. In a rural conservation works program, the present unemployed and underemployed in agriculture would be put to the productive task of building up our greatly depleted soil, forest, and water resources.

We need to find secure incomes for more than 3 million men now living on farms, probably half of whom are wholly or partly unemployed while the other half and their dependents barely exist on gross cash incomes averaging not more than \$200 to \$300 annually. With each passing year many more men and boys of working age are likely to be looking for opportunities on the land. It has been estimated that these people represent an unused annual labor supply of 450 million man-days.

THE very areas where most of these needy farm people live are the same areas where our natural resources have been punished the most severely. To rebuild these resources to a safe level and to protect them will require many millions of man-days of labor. As far as we can see right now, to do the things we know should be done, is a task that requires at least 1½ billion man-days of labor.

A rural conservation works program that would marshal the unused and wasted rural manpower now available to perform this needed task of conservation on our farms, ranges, and forests would go a long way toward giving the temporary security and supplementary income so badly needed by these people and, at the same time, would be building up a physical base underneath them and the whole population of great permanent value. The program, as envisaged, would in-

clude both work projects and credit activities. As far as possible these projects should be fitted into existing administrative machinery so that there would be continuity in conservation efforts and duplication avoided.

OTHER measures are needed to provide permanent security and rehabilitation for these people. One is a proposal that the present Farm Security Administration program of supervised loans, debt adjustment, and the like be extended to reach a greater number of the low-income group. Such an extension would require an increase of supervisory personnel and funds for work grants to be tied to a farm plan and used in conjunction with rural rehabilitation loans.

If the lowest income group is to be rehabilitated, either some means of supplementing its farm income from part-time work off the farm will have to be found, or a part of the group will have to be relocated in areas of greater opportunity. If enough families left these areas, the size of farms of the remaining families could be increased so that with the aid of the Farm Security Administration most of the remaining families could become self-supporting. If those families who would leave were to remain in agriculture, it would be necessary for them to have access to good land, either new lands which may become available through drainage or irrigation, or flood-control measures, or by subdividing the large holdings of good land which is now thinly populated. Development of local industries which would furnish part-time employment opportunities for the families in this group would obviate the necessity for part of them to relocate. About the only alternatives to relocation or part-time employment off the farm would be either a permanent public works program or permanent relief.

THREE remedies are suggested to meet the problems of displaced farm labor: A farm-placement service both for short-time labor and for permanent settlement, either as farm operators or as farm workers; a housing program, including camps for migratory workers, labor homes in areas in which it is desirable to maintain, within the area, the peak-season labor supply throughout the year; a rural counterpart of wages and hours unemployment and old-age devices needed for farm labor.

Another major proposal looking toward the rehabilitation and permanent security of these displaced and underprivileged people is to encourage and maintain the family-sized farm. Various measures might be adopted. One is to expand the present tenant-purchase program so that the Government can make loans on a much larger scale than at present to qualified tenants, sharecroppers, and farm laborers to enable them to acquire family-sized farms and to make the necessary improvements on them. A second suggestion is to provide that all reclamation and other new farm land developments be settled on a family-sized and owner-operated basis and that the perpetuation of this tenure system be guaranteed.

ANOTHER suggestion is to settle or resettle shifting and nonowner farm families on good lands now owned and operated in larger than family-sized units. A fourth is to extend cooperative loans, and technical guidance when needed, to groups of operators of family-sized farms, both owners and tenants, for the purchase of pure-bred sires, mechanical equipment, and like things as a means of bringing the latest, proved benefits of technology to relatively small farms.

A companion measure is to extend Federal aid, both financial and advisory to farm-forest cooperative associations, which hold considerable promise for betterment in the marketing and

management aspects of farm forestry.

Of two methods for fitting machines and equipment to farms, one involves designing machines to fit the needs of the farms, and the other involves "designing" the farms to fit the capacities of the machines and equipment. The objective of both is to lighten the overhead costs of owning and operating equipment. Small farms would benefit even from the cooperative ownership of ordinary farm machinery such as combines, manure spreaders, drills, and the like. A fifth suggestion is further to scale Agricultural Adjustment Administration allotments and payments in favor of the small producer. A sixth suggestion is to equalize credit opportunities by making credit available to small holders at reasonable rates of interest.

THE well-being of disadvantaged farm people might be greatly improved if they were able to use their otherwise idle time in the production of things that they want and need. More farm people might have electricity, for example, if they were to pool their labor and abilities for the purpose of constructing electric lines in their communities. Rural industries and handicrafts also can help disadvantaged farmers by providing additional employment opportunities.

A great deal more attention needs to be directed toward part-time farming, or the organization of small farm holdings around factories and small industrial centers in such manner as to allow people to live in the country and divide their working time between agricultural and industrial employment.

Successful noncommercial farming requires that some cash income be obtainable for the purchase of articles that cannot be produced in agriculture, and the land must be fertile enough to avoid large cash expenditures for fertilizer. If the land requires fertilization, some sort of financial assistance will have to be provided.

Much of the noncommercial farming is now confined to the poorer land, but a positive approach to the extension of this type of farming is the establishment of such farms in areas of commercial agriculture, where land is more productive, and part-time farm employment for cash will be more plentiful.

COOPERATIVE farming, too, can bring benefits to farm families. It involves more than the cooperative ownership of machines. It includes also operation of the land and cooperative sharing in the returns. A competent manager of cooperative farms can effect more efficient operation than is possible on many individual units. Land and buildings may or may not be jointly owned. If not, a satisfactory arrangement is to keep title to the land and buildings in the hands of a public agency so that the plant can be maintained on a continuous basis.

A lack of adequate training and education handicaps disadvantaged farm people. A training system of instruction and direction in methods of earning a living is a remedy. A farm laborer who is taught the more general farm operations and how to operate specialized machines and equipment can more easily get work on highly mechanized farms and in farm forestry. New tractors, electric appliances, and other mechanical devices on farms have created a need in rural areas for individuals skilled in servicing the various machines.

MEASURES needed to stabilize agricultural economic conditions may be divided into (1) measures designed to increase consumption and demand, and (2) measures designed to stabilize returns to commercial producers, including such devices as acreage adjustment, commodity loans, crop insurance, marketing quotas, and marketing agreements.

The most obvious way to increase the total demand for agricultural prod-

ucts would be through a general raising of national income so that all classes would have increased sums to spend. There appear to be two general ways to expand domestic consumption and demand for farm products—by increasing the consumption of food and clothing by low-income groups, and by discovering new industrial uses for farm products.

One way in which to add to the purchases of farm products is to extend the food stamp plan and the surplus commodities purchase program. The results obtained from these measures are promising and it would seem especially desirable to consider the rather rapid extension of the food stamp plan, provided the present situation with respect to unemployment and underemployment continues to persist.

Another approach to the problem is by lowering costs of distribution, either through market reorganization or through the adoption of special techniques for increasing sales and decreasing the cost of marketing and distribution.

Educational emphasis upon the need for better diets is another means of increasing consumption. The expansion of industrial uses for agricultural products calls for chemical and technological research in order to find new uses for farm products, the development of efficient processing and manufacturing methods, and the introduction of the new products on the commercial markets.

UNTIL such time as the effective demand for agricultural products can be substantially expanded, it seems desirable to continue or strengthen current activities designed to maintain agricultural prices and income at a reasonable level. One of the most effective devices in this field is, of course, the ever-normal granary program. One of the essential features of the plan is that loans will be made to farmers in years when yields are good and stocks and production are high, at

something above the price that otherwise would prevail, and that these loans and the accompanying surplus stocks will be liquidated in years when yields are below average or demand is high. The device undoubtedly is effective for stabilizing agricultural prices and supplies and one that works in the interest of both the general public and the farmers themselves. But care must be taken to see that the loan rate is not so high that serious losses will follow, and that the loan program is geared in with the acreage adjustment and marketing quota approaches in such a way as not unduly to stimulate acreage and production.

ATTENTION should be given to the need for better rural facilities. Owing to the fact that our agriculture has been exploited, and that our pioneering psychology has led a large number of people to look for a return in the form of increased land values rather than in the form of a stable and satisfying rural life, the rural facilities, such as roads, schools, and to a marked extent rural housing, have not been developed adequately even in the better farming sections of the United States.

We must develop a permanent agriculture to allow for a needed investment in roads, houses, and other rural service and living facilities. Farm prices and farm income must be maintained at such a level as to allow the needed investment. If we are to de-

velop a rural life in which the technical and other elements are integrated in the most desirable manner, we must work toward developing a rural life that is generally recognized as a desirable way of living. Rural youth must be interested not only in the material comforts of life, but they must also be trained in such a manner as to derive considerable satisfaction from the fact that they themselves are an important part of one of the classes whose work is most fundamental to our American civilization—our agricultural group.

IN our consideration of problems and remedies, we should not assume that industrial expansion—the best way to absorb those who have no particular desire to remain in agriculture—has ceased for all time. Something like a huge defense program may be a key to industrial expansion; if so, certain of the suggested remedies no longer will be needed badly. But of several details we should be mindful: Industrial expansion through armament expansion may be temporary and lead only to a recurrence of the problems we have been encountering; we should seek permanent stability for American farming; over a long period, it should be possible for the United States to adjust its economy in a way that will permit expansion of production in industry and agriculture. That would make possible a higher level of living for the entire population. That is our goal.

Adjustment.—More than 6 million farmers, operating 82 percent of the cropland of the United States, are participating in the AAA Farm Program this year. Last year, about 80 percent of the nation's cropland was under the program. In the Southern Region 2,590,000 farmers are participating in the program this year; in the East Central, 1,019,000 farmers; Western, 617,000; North Central, 1,568,000; Northeast, 226,000.

EXPORTS: Curtailed

After a year of war in Europe it is becoming increasingly evident that export demand for our farm products is considerably smaller than it otherwise would have been. The value of domestic agricultural exports in July 1940 was only about 1 percent above that of July 1939. Under peace-time conditions, with industrial activity at a considerably higher level than a year earlier, and with abundant supplies of farm products, exports in July probably would have been considerably in excess of those a year earlier.

Perhaps a clearer picture of the adverse effects of the war on exports is presented by changes in the export volume of some individual farm products which are not subject to export subsidy payments. Pork products exported in July 1940 totaled 3.2

million pounds as compared with 16.9 million pounds a year earlier. The decline in exports of fresh deciduous fruits was also pronounced. Despite much smaller exports of leaf tobacco in previous months than a year earlier, tobacco exports in July 1940 were just about the same as in July 1939. Lard exports were higher in July 1940 than they were a year earlier. Exports of both tobacco and lard are affected by the controls being exercised by the British Government.

Even with the continental European import market closed, exports of United States industrial products in July were 43 percent higher than in July 1939. The stimulating effect of this on domestic industrial activity and on the consumer demand for farm products continues to offset, at least in part, the adverse influence on farm prices and income, of the unfavorable farm product export situation.

—P. H. B.

UNITED STATES: Exports and Imports of Specified Agricultural Commodities, July 1939 and 1940, and September-July 1938-39 and 1939-40¹

Commodities	Unit	July		September-July	
		1939	1940	1938-39	1939-40
Exports:					
Pork:					
Cured pork ²	Lb.	Thousands	Thousands	Thousands	Thousands
9,904		1,168	69,902	44,562	
Other pork ³	Lb.		2,065	42,093	71,961
Total pork.....	Lb.	16,884	3,233	111,995	116,523
Lard, including neutral.....	Lb.	25,339	28,239	241,085	236,856
Wheat, including flour.....	Lb.	7,270	3,686	98,620	41,755
Apples, fresh ⁴	Bu.	108	53	11,749	2,875
Pears, fresh.....	Lb.	8,944	2,896	140,477	67,443
Tobacco, leaf.....	Lb.	13,908	13,948	415,016	288,782
Cotton, excluding linters (500 lb.).....	Bale	113	143	3,300	6,300
Imports:					
Cattle.....	No.	56	43	696	588
Beef, canned, including corned.....	Lb.	8,082	4,070	75,618	71,415
Hides and skins ⁵	Lb.	22,599	23,310	272,173	298,609
Barley malt.....	Lb.	10,136	3,588	97,589	56,336
Sugar, cane (2,000 lb.).....	Ton.	354	293	2,294	2,967
Flaxseed.....	Bu.	1,123	661	17,652	12,238
Tobacco, leaf.....	Lb.	5,171	6,140	54,482	58,147
Wool, excluding free in bond for use in carpets, etc.	Lb.	5,544	10,232	64,430	161,310

¹ Corrected to August 20, 1940.

² Includes bacon, hams, shoulders, and sides.

³ Includes fresh, pickled, or salted, and canned pork.

⁴ Includes baskets, boxes, and barrels in terms of bushels.

⁵ Excludes the weight of "other hides and skins" which are reported in pieces only.

Economic Trends Affecting Agriculture

Year and month	Industrial production (1935-39 = 100) ¹	Income of industrial workers (1924-28 = 100) ²	Cost of living (1924-29 = 100) ³	Whole-sale prices of all commodities ⁴	(1910-14 = 100)			Farm wages	Taxes ⁵		
					Prices paid by farmers for commodities used in ⁶						
					Living	Production	Living and production				
1925	91	98	101	151	164	147	157	176	270		
1926	96	102	102	146	162	146	155	179	271		
1927	95	100	100	139	159	145	153	179	277		
1928	99	100	99	141	160	148	155	179	279		
1929	110	107	99	136	158	147	153	180	281		
1930	91	88	96	128	148	140	145	167	277		
1931	75	67	88	107	126	122	124	130	253		
1932	58	46	79	95	108	107	107	96	219		
1933	69	48	76	98	109	108	109	85	187		
1934	75	61	78	109	122	125	123	95	178		
1935	87	69	80	117	124	126	125	103	180		
1936	103	80	81	118	122	126	124	111	182		
1937	113	94	84	126	128	135	130	126	187		
1938	88	73	82	115	122	124	122	124	186		
1939	108	83	82	113	120	122	121	124	-----		
1939—August	104	83	81	109	-----	-----	119	-----	-----		
September	113	86	82	115	122	123	122	-----	-----		
October	121	91	82	116	-----	-----	122	126	-----		
November	124	93	82	116	-----	-----	122	-----	-----		
December	126	93	82	116	121	123	122	-----	-----		
1940—January	122	93	82	116	-----	-----	122	119	-----		
February	116	89	82	115	-----	-----	122	-----	-----		
March	112	87	82	114	121	125	123	-----	-----		
April	111	86	82	115	-----	-----	123	124	-----		
May	114	87	82	114	-----	-----	123	-----	-----		
June	121	89	83	113	121	125	123	-----	-----		
July	121	91	83	113	-----	-----	122	129	-----		
August ⁷	-----	-----	113	-----	-----	-----	122	-----	-----		

Index of prices received by farmers (August 1909-July 1914 = 100)

Year and month	Grains	Cotton and cotton-seed	Fruits	Truck crops	Meat animals	Dairy products	Chickens and eggs	All groups	Ratio of prices received to prices paid
1925	157	177	172	153	140	153	163	156	99
1926	131	122	138	143	147	152	159	145	94
1927	128	128	144	121	140	155	144	139	91
1928	130	152	176	159	151	158	153	149	96
1929	120	144	141	149	156	157	162	146	95
1930	100	102	162	140	133	137	129	128	87
1931	63	63	98	117	92	108	100	87	70
1932	44	47	82	102	63	83	82	65	61
1933	62	64	74	105	60	82	75	70	64
1934	93	99	100	103	68	95	89	90	73
1935	103	101	91	125	118	108	117	108	86
1936	108	100	100	111	121	119	115	114	92
1937	126	95	122	123	132	124	111	121	93
1938	74	70	73	101	114	109	108	95	78
1939	72	73	77	105	110	104	94	93	77
1939—August	64	71	70	99	101	100	90	88	74
September	83	76	73	117	117	107	102	98	80
October	77	74	73	128	112	112	108	97	80
November	79	75	66	123	107	117	117	97	80
December	87	82	65	96	101	118	97	96	79
1940—January	90	85	68	117	103	119	91	99	81
February	91	85	76	168	101	118	98	101	83
March	92	85	73	128	102	114	83	97	79
April	96	85	81	145	104	110	82	98	80
May	92	83	88	133	108	106	84	98	80
June	83	81	104	134	102	104	81	95	77
July	78	80	89	98	110	105	88	95	77
August	76	88	79	112	110	109	90	96	77

¹ Federal Reserve Board, adjusted for seasonal variation. Revised August 1940. ² Adjusted for seasonal variation.

³ Monthly indexes for months not reported by the Bureau of Labor Statistics are interpolated by use of the National Industrial Conference Board cost-of-living reports.

⁴ Bureau of Labor Statistics Index with 1926 = 100, divided by its 1910-14 average of 68.5.

⁵ These indexes are based on retail prices paid by farmers for commodities used in living and production reported quarterly for March, June, September, and December. The indexes for other months are interpolations between the successive quarterly indexes.

⁶ Index of farm real estate taxes per acre. Base period represents taxes levied in the calendar years 1909-13, payable mostly within the period Aug. 1, 1909-July 31, 1914. ⁷ Preliminary.

Note: The index numbers of industrial production and of industrial workers' income shown above are not comparable in several respects. The base periods are different. The production index includes only mining and manufacturing; the income index also includes transportation. The production index is based on volume only, whereas the income index is affected by wage rates as well as by time worked. There is usually a time lag between changes in volume of production and in workers' income, since output can be increased or decreased to some extent without much change in the number of workers.